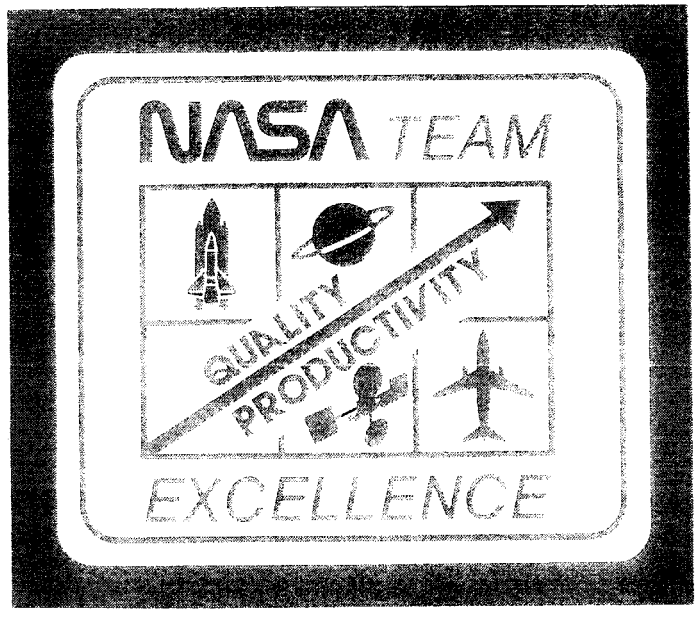
National Aeronautics and
Space Administration

Improving Organizational Productivity in NASA



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Positive Features of the WCPI Process

Focuses on group performance rather than on individuals to foster cooperation and teamwork

Identifies services and objectives of the organization to clarify priorities and put organizational activities into perspective

Concentrates on effectiveness rather than efficiency alone to ensure that the organization is meeting client/user needs

Emphasizes use of representative steering committees and task teams throughout the process to encourage employee participation, develop team spirit, and improve communications regarding the organization and the improvement effort

Focuses on achievement of tangible results throughout the process to give credibility to the improvement effort by demonstrating that change is possible

Develops a family of indicators, or measures, to assess progress in meeting objectives and to identify opportunities for improvement

Project Benefits

Provides a practical, structured approach for managing continuing improvement through employee participation

Identifies and supports implementation of specific work output improvements

Identifies and supports implementation of quality of worklife enhancements

Develops project participant skills related to leadership, communications, and conducting effective meetings

Increases team spirit and employee support for productivity improvement

Develops measurement criteria to assess progress and identify improvement opportunities

Improving Organizational Productivity in NASA

Results of NASA Efforts in the White Collar Productivity Improvement Action Research Project

Ames Research Center
Goddard Space Flight Center
Lyndon B. Johnson Space Center
Lewis Research Center
George C. Marshall Space Flight Center

Volume II
April 1986

Foreword

Recognizing that NASA has traditionally been in the forefront of technological change, the NASA Administrator challenged the Agency in 1982 to also become a leader in developing and applying advanced technology and management practices to increase productivity. One of the activities undertaken by the Agency to support this ambitious productivity goal was participation in a 2-year experimental action research project devoted to learning more about improving and assessing the performance of professional organizations.

Participating with a dozen private sector organizations, NASA explored the usefulness of a productivity improvement process that addressed all aspects of organizational performance. This experience has given NASA valuable insight into the enhancement of professional productivity. More importantly, it has provided the Agency with a specific management approach that managers and supervisors can effectively use to emphasize and implement continuous improvement.

This report documents the experiences of the five different NASA installations participating in the project, describes the improvement process that was applied and refined, and offers recommendations for expanded application of that process. Of particular interest is the conclusion that measuring white collar productivity may be possible, and at a minimum, the measurement process itself is beneficial to management.

Volume I of the report provides a project overview, significant findings, and recommendations. Volume II presents individual case studies of the NASA pilot projects that were part of the action research effort.

David R. Braunstein
Director, NASA Productivity Programs

Acknowledgements

All employees and managers actively involved in the NASA pilot groups participating in the White Collar Productivity Improvement Project are to be commended for their willingness to act as pioneers responding to a comparatively new management challenge -- improving white collar productivity. Their effort is a vivid example of NASA commitment to improving productivity. As a result, they have made a significant contribution to NASA's insight into techniques for enhancing professional work.

Special acknowledgement is also given to the senior managers who made pilot group participation in the project possible, even though their organizations were already carrying a substantial workload. These key lead managers were: Ames Research Center -- Louis H. Brennwald, Director of Administration, and Paul Bennett, Chief, Technical Information Division; Goddard Space Flight Center -- Charles E. Wash, Comptroller, and John T. Langmead, Chief, Financial Management Division; Johnson Space Center -- Aaron Cohen, Director of Research and Engineering; Thomas L. Moser, Director, Engineering; Dr. Joseph P. Kerwin, Director, Space and Life Sciences; Walter W. Guy, Chief, Crew and Thermal Systems Division; and William H. Bush, Chief, Life Sciences Project Division; Lewis Research Center -- Paul G. Anderson, Comptroller; Joseph A. Saggio, Chief, Procurement Division; J. Stuart Fordyce, Director of Aerospace Technology; and Salvatore J. Grisaffe, Chief, Materials Divsion; Marshall Space Flight Center -- J. E. Kingsbury, Director of Science and Engineering; William R. Reynolds, Director, Productivity Improvement; and James G. Sturdivant, Associate Director for Management.

In addition, the authors of the individual case studies are recognized for their significant contributions to this report. Special acknowledgement is also given to Wanda M. Thrower of the Johnson Space Center for her dedicated efforts in preparing the summary of NASA pilot experience presented in volume I and for editing the entire document.

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Pilot Project Case Studies

NASA Lewis Research Center, Materials Division*

Overview

This report describes the implementation and progress of a white collar productivity pilot program conducted by the Materials Division (MD) at NASA Lewis Research Center (LeRC), a research group of approximately 105 people. The White Collar Productivity Improvement (WCPI) model was used, modified by the needs of the pilot. Evaluation of the success of the program is preliminary but positive. Sufficient progress has been made to justify the indefinite continuance of the program.

Introduction

The MD has a staff of 105 of which approximately 90 are professional scientists and engineers whose primary mission is to conduct research in high-temperature materials for aerospace propulsion systems. Of the professional staff, approximately 40 have attained the PhD level, and approximately 25 have master's degrees. Their major fields of research include metals, ceramics, polymers, advanced composites, environmental effects, and tribology. The research conducted ranges from fundamental to highly focused, with the major emphasis on the latter.

Because this pilot group represents one of a very few formal efforts in the improvement of productivity in a research environment, the group met the announcement of its participation in the WCPI program with considerable skepticism and, in some cases, outright hostility. Another factor that compounded the problem was that reorganization of the Division had been implemented 3 months before the initiation of the pilot program in December 1984. Three months after initiation of the pilot program, another reorganization was announced, the impetus for which came from the LeRC senior management's desire to reduce management by one layer as part of an attempt to increase communication and participative management. The subsequent reorganization, which was accomplished by consolidation of the first two lines of supervision, was put into effect informally during the summer of 1985 and became official in October of the same year (figure 1).

The WCPI consultant duties consisted primarily of initiating each phase. He was onsite approximately 1 day per month from December 1984 to July 1985. It was recognized immediately that because of the unique factors facing the MD pilot project, more outside help would be needed, and the services of an additional local independent consultant were acquired, primarily for use in the areas of communication and interpersonal relations. It was also recognized that for the program to be a success, broad participation of the staff would be essential. The Deputy Division Chief was chosen to lead the pilot project, and his first action was to assemble a task force of 10 staff members whose assignment was to manage the entire pilot program. This task force was selected so that both management and nonmanagement were represented in approximately the same ratio as the staff as a whole. In addition, care was taken in this selection so that each organizational segment

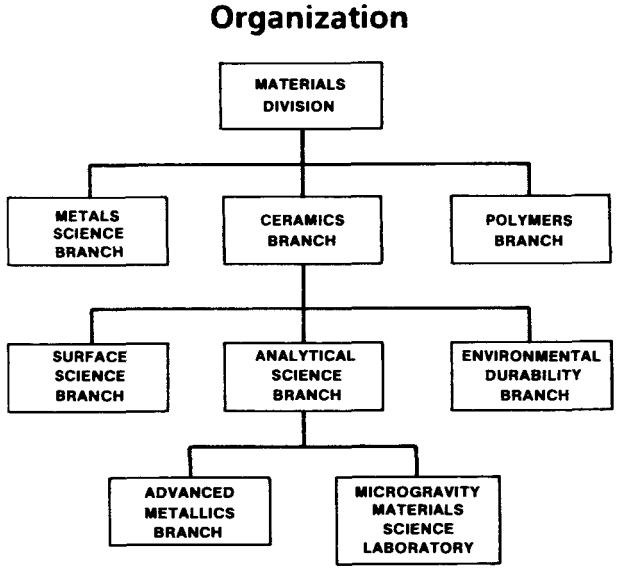

Figure 1

*By Carl E. Lowell, Deputy Division Chief, Materials Division.

staff and managers. Approximately one-third of the interviews were conducted by the WCPI consultant, with the balance conducted by the independent consultant. The results of both the questionnaire and the interviews were the same. There were two major findings: (1) No major barriers were present in the opinion of the staff (henceforth referred to as the pilot group) that would prevent the initiation of the pilot program, and (2) members of the pilot group were generally satisfied with both their environment and the nature of their work and felt they had the resources required to pursue their work. The conclusion of this phase marked the real beginning of the program.

Objectives Phase

The objectives phase was initiated by a clear statement of the Division's Charter which is to:

> Help strengthen the United States position in world civilian and military competition by: applying the Division's skills to opportunities in aerospace propulsion and power; in microgravity science and applications, as well as in space commercialization; and in other high-priority national efforts, including Research and Development quality/ productivity enhancement; so as to make significant, recognized, timely contributions to United States technology.
>
> Selectively increase the access to the Division's staff and facilities for United States industrial and academic researchers.

This statement was made to a meeting of the task force and Division management simultaneously and formed the basis for classifying the products of the Division's primary objectives. Four product areas were identified.

- Research and technology
- Applied problem solving
- Technical expertise
- Outside contracts and grants

Of the products, the first, research and technology, is the easiest to understand. It is simply the research done as a result of the Division's identification of aerospace propulsion technology requirements, forms the bulk of the MD work and is usually of long-term (more than 1 year) duration. Applied problem solving is that work initiated at the request of another Division, NASA center, or Government agency to perform work, usually applied and focused research with a definite end date. Technical expertise is the result of the development of an outstanding staff, a recognized pool of talent which can be and is used by technical societies, Government agencies, etc., to contribute knowledge and skills, to give presentations by invitation, to serve on technical committees, to act as consultants, etc. Finally, outside contracts and grants implies the initiation and management of research done by others; i.e., industry and universities.

After the Division products had been identified, a permanent team was formed for each product, with a nucleus of task force personnel in each who were given the responsibility and authority to carry out the rest of this phase and all subsequent phases. The team sizes ranged from 5 to 10 members, primarily nonsupervisors. Each team then met and developed a set of no more than four major objectives for the product for which the team was responsible. These objectives and measurements, which are discussed in the subsequent section, are shown in figure 3.

Once established, the objectives were submitted to the Division managers for review and approval; this was accomplished with only very minor revisions.

It may be argued that the Division's products could have been classified in many other ways, some of which would be more advantageous than this set. However, the set identified covers all of the Division's work and has been found to work well.

Measurement Phase

Most of the questions the pilot group had early in the project centered around the belief that research could not be measured. A good case could be made for such a position. However, in the absence of measurements, how does one decide whether progress is being made? The approach taken by the teams under the leadership of the task force was to acknowledge

Product Area: Initiate and manage outside research	
Objectives	**Measures**
Initiate and manage contracts and grants	Track time each contract or grant proposal was kept in the Division (from start of statement of work to procurement request approval; from receipt of proposals to completion of technical evaluation or contract)
	Contractor performance (timeliness of performance vs work plan, cost overruns, number of modifications, terminations, and defaults/contract)
Propose and advocate new contract or grant efforts and obtain sources of funding	Number of funding sources identified and contacted/ proposed effort
	Dollars received vs dollars requested/request
	Percent of advocacy packages
Stimulate ideas, resources, help from universities or private sector to augment Division programs	Number of unsolicited proposals and requests for proposals
Train and develop work force and identify potential candidates for Division employment	Number of students, co-ops, and summer employees supported by the Division vs total number supported by Lewis Research Center
Product Area: Technical expertise	
Objectives	**Measures**
To gain national and international recognition/ visibility via effective participation in society and national organizational activities	Categorization of papers and presentations produced by Division: keynote/invited, referred, and nonreferred
Maintain and attract high-quality staff	Percent of job offers accepted by civil service candidates, percent of job offers accepted by support service contractors
	Number of people who leave voluntarily to accept another position (including early retirees)
	Percent of summer and co-op students who remain as permanent employees
	Number of PhD's, MS's, BS's, and technicians/staff (civil service and support service)

Figure 3.- Concluded

being processed is as yet far from clear. Nonetheless, even with the current list, the feeling is that gauging whether the Division's productivity/quality is progressing, regressing, or treading water will be possible. With that as a basis for measurement, the pilot project proceeded.

Service Redesign Phase

One of the most important, if not the most important, phase is service redesign, meaning what should be done to improve the Division's productivity/quality. For this purpose, each team developed a "road map" or flow diagram for its respective products, identified major

Weaknesses

1. The initial presentation was not geared to scientific staff.

2. Use of jargon exceeded that needed for clarity.

3. The methodology was not explained in terms that were clear and meaningful to the pilot group.

4. No examples of measurement criteria applicable to R&D were available to guide the pilot effort to develop measures.

Recommended Changes

1. Initial presentations should be clear, short, and relevant.

2. Continuing onsite support for group dynamics is needed.

3. The program should be tailored to the professional discipline of the pilot group.

4. Most phases should be done in parallel.

In summary, the MD pilot program appears to have been a success to date. Some potentially useful changes have been implemented which should improve productivity/quality and, it is hoped, there will be more in the future. The degree of improvement remains to be seen; 6 months to a year probably will pass before a reasonable assessment can be made. At the very least, there has been a marked increase in the level of involvement of the staff in the direction the Division is taking, a development to be commended.

NASA Johnson Space Center, Crew and Thermal Systems Division, Systems Test Branch*

Overview

The Systems Test Branch (STB) civil servants participated in the White Collar Productivity Improvement (WCPI) Project beginning in March 1984. Initial pilot project activity was completed in December 1985, with service redesign, team development, and technology enhancement continuing as ongoing STB activities.

The WCPI consultant tutored the STB pilot group throughout the WCPI process and related techniques for productivity improvement. In order to develop measurements to establish the organization's productivity baseline, an analysis of STB operations was conducted to determine the services provided. A pilot project evaluation team (or task team) was established to carry out this analysis, which included data gathering concerning STB services, evaluation and redesign of the services, and development of measurements for evaluating productivity of the organization. Measurement data are being collected on a monthly basis to provide indicators of the effectiveness of the redesign efforts, and redesign to improve STB productivity will continue as dictated by the data being collected.

The STB must become more productive to accomplish an increasing workload. During the next 5 years, STB is faced with a tremendous increase in test operations as Space Shuttle crew training is provided to meet an increasing mission model, and the development and certification testing for Space Station thermal systems, environmental control and life support systems (ECLSS's), and extravehicular activity (EVA) systems are performed. As a result of participation in the WCPI project, STB has placed its computer services in proper perspective, Branch communications have improved, and procedures have been streamlined. Furthermore, through the development of measures, the project has provided STB with a source of data that can be used to assess services and identify the potential for additional improvement on an ongoing basis. The benefits of increased civil servant productivity will allow the Branch to meet the programmatic testing milestones committed to by the Crew and Thermal Systems Division (CTSD).

*By L. O. Casey, Chief, Systems Test Branch.

Introduction

The CTSD has a very large and complex testing laboratory that the STB operates in performing the development, certification, qualification, and anomaly investigation of life support and thermal systems for manned spacecrafts. These laboratories are grouped into three basic types located in separate facilities: (1) man-rated altitude chambers, (2) thermal-vacuum space simulators, and (3) small multipurpose vacuum and thermal test chambers.

1. The man-rated chamber test complex (building 7) includes five major chambers: 8-ft diameter, 10-ft diameter, 20-ft diameter, 11-ft diameter, and the Space Shuttle EVA Test Complex. These chambers are used to test life support systems for space vehicles including extravehicular systems (space suits and support hardware). This complex also provides Space Shuttle EVA crew training for each EVA-designated astronaut a month before the assigned mission.

2. The thermal vacuum space simulators include two large chambers: chamber A, 90 ft high by 55 ft in diameter, and chamber B, 20 ft high by 20 ft in diameter. These chambers provide high-fidelity space conditions, and ground tests in these facilities can be used to investigate a wide variety of design and development problems that could directly influence the performance of space hardware when stressed by the hostile space environment.

3. The small multipurpose vacuum and thermal test chambers provide a very versatile and relatively economical capability for elements of Johnson Space Center (JSC) to certify components and small systems for flight. There are 11 test chambers available to perform any or all of the space environmental simulations.

- There is conflict and lack of teamwork between STB and user branches. Hardware availability sometimes impacts schedules.
- Frequent schedule changes and emergency reactions to these changes leave an impression of a lack of concern about schedules.
- Financial reward is limited - "well done" praise and recognition is sporadic.
- Need for test and procedures for initiation of Test Requests (Form 90) at times is unclear. Data interpretation is restricted.
- There are infrequent opportunities to make decisions; management is involved in lower level decisions and activities.

Specific Opportunities

- Increase teamwork and management to reduce conflict between the Test Branch and user branches.
- Clarify the manner in which the STB will manage the transition from Space Shuttle to Space Station testing; coordinate the transition with the user branches.
- Review Test Branch input to technology design and interpretation of test data; consider added value, impact on morale, and work schedules.
- Develop indicators of the effectiveness of Test Branch support or service to reflect timeliness and quality of service.
- Identify authority and decisions which may be delegated to lower levels within the Branch; ensure that personnel are prepared to handle the responsibility.

Recommendations

- Form a task force to review the observations and to guide the WCPI project.
- Utilize the next two phases in the WCPI project (objectives, measurement) to clarify the shift to Space

Crew and Thermal Systems Division

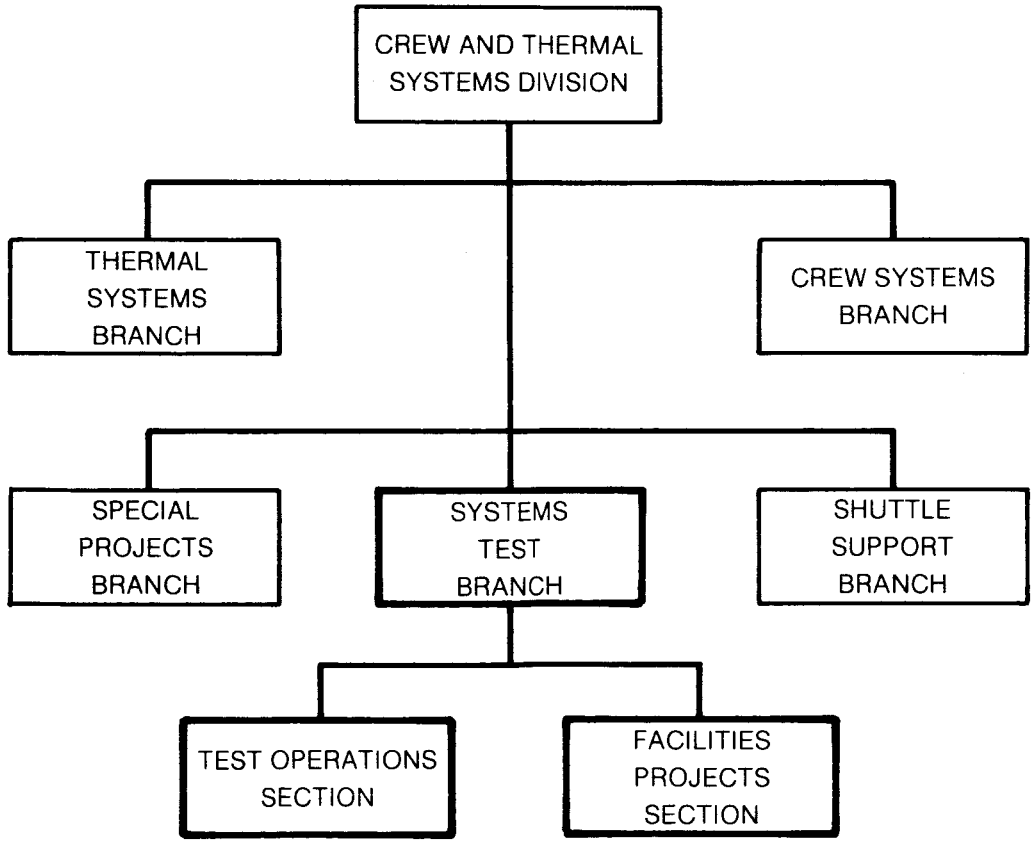

Figure 4

list of measures and appendix A for related survey forms and worksheets).

Service Redesign Phase

As a matter of existing policy, STB redesign and organizational adjustment to meet the changing service expectations of CTSD take place immediately after identification. Several major redesigns occurred during the period the WCPI process was being used. These redesigns included the following:

1. Computer service was added to Branch responsibilities, including two civil servants and six support contractors necessary to initiate the service.

2. Parallel paths were developed for test requests. A short path to CTSD approval was provided for small-scale simple tests as

Systems Test Branch Services/Objectives/Measurements

Service: Provide tests/crew training	
Objectives	**Measures**
Provide safe and reliable space simulation facilities	Number of facility incident reports per fiscal year Number of test delays per test caused by facility problems Number of unscheduled maintenance requests per month Number of total waivers (of regulations, standards) per test complex per fiscal year
Develop detailed test procedures that satisfy user intent	Perform posttest user survey after each test or series
Follow test procedures	Number of deviations per test
Provide complete, accurate test data and assist in its interpretation	Number of unprovided data requests per test Number of real-time discrepancy reports per test related to data Number of man-year equivalents per test in assisting in interpretation of data
Meet program/project schedules	Number of Division test schedule changes per month caused by test personnel, hardware, facility, or other
Increase automation of test facilities	Ratio of man-hours before and after automation per test type Number of subsystems automated per test facility per fiscal year
Service: Provide computer system support to Crew and Thermal Systems Division	
Objectives	**Measures**
Operate integrated computer complex for office automation, computer assisted drafting, and analysis without impacting test operations	Evaluation surveys each 6 months of first level supervisors and selected representatives for feedback comments, desired new applications, and degree of automation accomplished Number of test operations impacted by CTSD computer support per test and reasons Average hours of usage per individual account Percent of computer mainframes utilization per month Time, day of week peak maintenance demand

Figure 6

increased testing required for Space Station hardware

4. Computer aided design systems for configuration control and drafting

Benefits

The major benefits of the WCPI process to STB are apparent in the following project outcomes:

1. Computer support "services" were placed in perspective for the Branch during the objectives phase.

2. The "early success" exercise resulted in numerous improvements in Branch communications.

3. A method for service redesign and measurement feedback was established that will continue to provide real data to enhance the effectiveness of the Branch in the following areas:

    a. Elimination of routine paper/forms

    b. Impact oriented electronic scheduling

    c. Possible restructuring of test operation groups to accommodate services

    d. Establishing a common way of doing business in all three Branch facilities

    e. Measurement data to help identify resource hoarders (data currently being collected)

    f. Development by the task team of an index factor to provide a simplistic trend indicator of effectiveness of STB operations (productivity index)

WCPI Survey for Test Requestors

In order to gather information on our services and their effectiveness, each "user" of our services is requested to complete this survey. Although this information is your subjective opinion, it will be considered as absolute and final and be used to feed a data base, providing STB with valuable feedback. Thank you for your cooperation.

L. O. Casey

E. YES NO This test satisfied your primary objective(s).

F. YES NO This test satisfied your secondary objective(s).

G. YES NO The Detailed Test Procedures were adequate to achieve your intent.

H. YES NO Test data were as advertised by STB.

I. YES NO The test director/team could significantly improve their efficiency/effectiveness.

J. YES NO STB made a reasonable effort to meet requested schedule date.

K. YES NO Test was performed during user-requested time period.

L. List any significant observations that you feel could improve STB's effectiveness.

1.

2.

3.

TITLE:

USER: INITIAL/DATE

MEASUREMENT DATA POSTED: NAME _____ DATE _____

STB PRODUCTIVITY DATA SHEET, FY 86

MEASUREMENT	OCT	NOV	DEC	JAN	FEB	MAR	STL	APR	MAY	JUN	JUL	AUG	SEP	TTL
NO. POST-TRRB TEST DELAYS - FACILITY	1	2	0											
NO. DEVIATIONS	1	2	0											
NO. IDR'S RELATED TO DATA	1	1	1											
NO. TEST OP. IMPACTED BY CSD COMPUTER	0	1	1											
USER PRIMARY OBJECTIVE YES	3	6	2											
USER PRIMARY OBJECTIVE NO	0	0	0											
USER SECONDARY OBJECTIVE YES	2	6	2											
USER SECONDARY OBJECTIVE NO	0	0	0											
DTP ADEQUATE YES	3	6	2											
DTP ADEQUATE NO	0	0	0											
TEST DATA AS ADVERTISED YES	2	5	2											
TEST DATA AS ADVERTISED NO	0	1	0											
TD/TEAM SIG. IMPROVE EFFICIENCY YES	0	0	0											
TD/TEAM SIG. IMPROVE EFFICIENCY NO	2	6	2											
STB EFFORT TO MEET SCHEDULE YES	3	6	2											
STB EFFORT TO MEET SCHEDULE NO	0	0	0											
TEST DURING USER REQ. TIME YES	3	6	2											
TEST DURING USER REQ. TIME NO	0	0	0											
NO. UNSCHEDULED MAINTENANCE REQUESTS	35	12	18											
NO. DIVISION SCHEDULE CHANGES/MONTH	11	10	1											
NO. FACILITY INCIDENT REPORTS	1	2	1	-	-	-	-	-	-	-	-	-	-	-
NO. ITEMS REQUIRE WAIVER	44	44	44	-	-	-	-	-	-	-	-	-	-	-
RATIO MAN-HRS/BEFORE, AFTER AUTOMATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO. SUBSYSTEMS AUTOMATED/FY	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 MONTH USER FEEDBACK	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEGREE AUTOMATION SEMIANNUAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVERAGE HOUR/USER COMPUTER	.2	.2	.2											
% COMPUTER MAINFRAME USE	37	37	32											

NASA Lewis Research Center, Procurement Division*

Overview

In 1984, the NASA Lewis Research Center (LeRC) Procurement Division initiated a pilot productivity project following the prescribed White Collar Productivity Improvement (WCPI) six-phase methodology. The pilot group successfully completed the project and has implemented many recommendations which are expected to positively impact Divisional productivity and enhance communications and participative management.

In summary, after a slow start, the project moved steadily forward. Unfortunately, project initiation was delayed because the project had not been adequately coordinated with the union during the scouting mission. During the diagnosis phase of the project, the WCPI consultant surveyed and interviewed the Division employees and gave a frank assessment of the strengths and weaknesses of the Division. During the objectives phase, the Division supervisors restated the existing Divisional goal and established supporting objectives. Next, measures were recommended by a cross-sectional task force and approved by the Division management. In a similar way, policy, procedural, and facility change recommendations were made to management by the cross-sectional task force supported by other ad hoc cross-sectional committees. As a result of these efforts, more than 30 improvements in operations, training, and facilities are underway.

Introduction

The LeRC Procurement Division is the functional organization responsible for the procurement of the supplies and services required by LeRC. This procurement responsibility encompasses base support and institutional requirements, project flight and nonflight hardware, and programmatic studies, investigations, and analyses. To accomplish this function, the Division has approximately 100 employees, slightly over half of which are professional administrative personnel (contract specialists, procurement analysts, and price analysts), 12 of which are paraprofessionals (purchasing agents and contract closeout specialists), 18 of which are clerical (procurement clerks and secretaries), and 15 of which are supervisory.

At the time of the project, the Division had three operational branches with nine subordinate sections to those branches and two staff offices reporting to the Division Chief. The branches and sections were organized primarily to support specific directorates within the Center, although one branch was organized by type of item/service being procured (automatic data processing equipment, construction, services, small purchases). The two staff offices were Operations and Contract Support. The Operations Office functioned as direct staff support for the Division Chief in areas of training, statistical analyses, dissemination of regulatory information, and reporting. The Contract Support Office's responsibility was to provide pricing reports and negotiation support to the operational branches and to perform administrative closeout of all Division contracts.

During the project, June 1984 through August 1985, some organizational changes occurred which had an effect on the pilot project. In January 1985, after the initial pilot manager's resignation from NASA, a new pilot manager was assigned. Also in early 1985, the Division was requested to prepare a revised organizational structure, eliminating one level of management. For several weeks, Division management participatively discussed alternatives to determine the best possible organization with the elimination of one level of management. The final plan submitted and eventually approved in June 1985 was for the nine sections to be eliminated, but with an additional four branches created. This change process resulted in greater uncertainty within the entire Division and generated some anxiety, especially within the supervisory ranks. However, direct impact on the project was small because, for purposes of the project, it was consciously decided to assume no organizational changes would occur and to modify recommendations as needed if and when reorganization did occur.

*By Bradley J. Baker, Chief, Launch Vehicles Branch.

Procurement Division Goal/Objectives/Measures

Goal: To make a major contribution to the achievement of the Lewis Research Center's mission, by providing professional procurement services in obtaining goods and services consistent with Center needs and legal requirements.

We will strive to use innovative techniques and new technologies, where helpful, to achieve this goal.

Objectives	Measures
Provide contracts within an appropriate time	Ratio of: $\frac{\text{Number of actions completed within planned lead time*}}{\text{Number of actions}}$
	User satisfaction survey for new contracts and new work modifications
Increase procurement participation in project/contract management	Quarterly contract specialist survey
Strive for continued mechanization of the procurement process	Ratio of: $\frac{\text{Types of documents prepared by automated means}}{\text{Types of documents frequently used}}$
	Quarterly contract specialist survey
Utilize clerical and paraprofessional personnel for routine procurement activities	Number of actions (by type) performed by clerical/paraprofessional personnel that were previously performed by contract specialist
Institute a procurement planning system with users	Ratio of: $\frac{\text{Number of actions completed within planned lead time*}}{\text{Number of actions}}$
	User satisfaction survey for new contract and new work modifications
Institute professional dialogue among procurement professionals	Number of divisional meetings available to the Division staff on procurement-related topics

*Planned = Mutual agreement of specialist and engineer

Figure 8

of the projects. The Chief of Procurement Division volunteered his Division to be the administrative pilot organization. This agreement was made without discussion within the Division, which later drew some criticism from Division supervisors and, to a lesser extent, from the Division rank and file.

However, the most significant factor of the scouting mission was the lack of consideration of union interest in the project. Unfortunately during the scouting period, the question of union involvement was not raised. Apparently, LeRC Procurement was the first white collar union organization to initiate a pilot, and hence no consideration was given to the issue of union participation. This oversight created a major schedule impact when, only hours before the formal introduction of the project to all pilot employees, the union requested information on the project and time to determine its position relative to this productivity project. The union's interest in the project forced postponement, at the last minute, of the February 1984 presentation until May 30, 1984. During this February to May time period, the union and management negotiated a written understanding regarding the project.

On May 30, 1984, the long-delayed presentation by the WCPI consultant was made to all employees of the Division. The consultant emphasized the WCPI design of effectiveness and service improvement rather than the efficiency and single numeric measurement indicators often seen in other productivity initiatives. Specifically, the WCPI methodology called for a family of measures to gauge progress and not the single measure of procurement lead time, so frequently emphasized in other earlier studies. Moreover, its design included Division-wide measures,

staff in this key policy area which was fundamental to following phases of the project. These decisions, attributable in part to the Division Chief's desire for the project to succeed, to his plan to be increasingly participative in his management style, and to the WCPI methodology of setting up a participative mode for these decisions, were significant in illustrating to the supervisory staff that they were a real part of the project.

Measurement Phase

Unfortunately, the interaction of the project with the supervisory staff diminished after the objectives phase as the cross-sectional task force was formed and was given the prime day-to-day responsibility of working through the project. This task force of seven was composed of elected members of each branch and office in the Division, one elected clerical representative, and an appointed supervisor as chairman. This group began working closely with the WCPI consultant at the September 1984 initiation of the measurement phase, gradually becoming increasingly self-sufficient as it became knowledgeable of the methodology and confident in its own abilities. The progress of the project slowed appreciably at the beginning of the measurement phase as the team learned the "jargon" of the WCPI and its NGT mode, became comfortable with its own internal workings, took time to understand the objectives which had been established by the supervisors, and relied on the once-a-month visit from the WCPI consultant for direction. During the measurement phase, though, the team clearly began to assume ownership of the project and to be committed to its completion. Within a month of being formed, the group agreed to establish a standard weekly meeting time to conduct WCPI business to reduce continuing conflict with other meetings and agreed to implement certain simple recommendations to keep the project visible and provide some measure of early success.

Operationally during this phase, the task force reviewed each of the six objectives established by the Division management and used NGT to develop measures of each objective. In addition, the task force called two other cross-sectional ad hoc groups of supervisory and nonsupervisory personnel to independently suggest possible measures of each objective via NGT techniques. After reviewing and discussing all the proposed measures, the task force in January 1985 finalized its recommended measures and submitted them to management for review and approval. This wide participation helped generate a variety of ideas and recommendations, kept the project visible to most of the Division, and led to greater acceptance of the project by those involved in it.

Unfortunately, the supervisory staff had almost no input in the development of the proposed measures and had not been actively involved in the WCPI project since the prior summer. This period of lower visibility of the project to the supervisors appeared to combine with the concern some supervisors had experienced in providing their employees time to work on the project (some supervisors were requiring strict sign-in and sign-out for each project meeting), and possibly with concerns about their role in the process as well. As a result, initial discussions of the measures with supervisors encountered some difficulty. However, in subsequent meetings, the Division Chief provided more visible support and some protection for the recommendations, and balanced this with an openness to rational, constructive comments. At this point, progress was rapidly achieved as constructive modifications to some recommendations were made and the measures approved. The task force was assigned the responsibility of implementation and maintenance of the measures.

Interestingly, the measures themselves contributed toward service effectiveness and better communication within and without the organization. Specifically, procurement personnel are implicitly encouraged to communicate with their customers, since a measurement is the relationship of the planned, mutually agreeable schedule to the actual schedule. Moreover, the Division is surveying the user community when procurement actions are completed to determine effectiveness from the user vantage point. Similarly, the Division is surveying its own contract specialists to learn their perceptions of customer interface, especially in the contract administration area. Through these surveys, the Division has been informed of certain problem areas and has learned that the actual users of its services are generally satisified with the services provided them,

organization a means to gauge its improvement in ways other than only lead time. The measures emphasize service effectiveness and quality as well as timeliness. Thus, the measures also signal a Divisional goal of improvement and excellence to all employees. The accepted recommendations address nearly every area of procurement and are beginning to result in less frustration, better quality output, and more timely contracts. Certainly communication within the Division has also improved as cross-sectional groups have met, supervisors have reviewed recommendations collectively, and grass-root suggestions have been solicited. Moreover, communications with user organizations have also improved as the users have been given formal channels to communicate their needs and concerns to the Division.

However, perhaps the most significant benefit has been the increased participation of the employees in improving the Division. Participation was part of the project design and led to over 50 percent of the employees in the Division actively participating in one or more of the project phases. Moreover, the creation of a cross-sectional task force provided a significant forum for employees, through their representatives, to take the initiative to improve the organization. This forum has remained, even after formal completion of the project, to monitor measures, examine additional areas for productivity enhancement, and act as a forum for communication between management and employees. A sense of excitement grew among the task force and other ad hoc committee members as management invited them to hear the disposition of the 40 recommendations. As the acceptance of many of the recommendations was shared, the optimism of the involved employees grew and their enthusiasm for implementation heightened. The barrier between supervisor and supervised blurred as together they shared a common desire for excellence in the organization.

At the conclusion of the project, 57 percent of the Division employees responding to a survey "saw some improvement as a result of going through the WCPI pilot productivity improvement project," with 20 percent uncertain whether there was improvement. In addition, 51 percent of the employees believed "other NASA organizations could benefit from a project like this," with 35 percent again uncertain. Overall, the pilot group saw benefit from the project, even though the survey was conducted before implementation of many of the recommendations for change.

Continuing Efforts

As addressed in the pilot methodology portion of this report, implementation of the accepted recommendations continues with actions scheduled. In addition, the measures continue to be checked to determine progress. Responsibility for monitoring the measures is being transferred from the task force to the Division staff office responsible for all other Divisional statistics. The task force itself will be reconstituted after an imminent Division reorganization, and its charter will again be reviewed.

Also, the Division has introduced its methodology to other organizations within Lewis and within the Agency. The Division presented its experiences at the Procurement Officers' Conference to procurement officers of all centers and to the Headquarters procurement staff. At Lewis, the Division made a similar presentation to the Center Director, his Deputy, and all Directors. Additional presentations have been given to the Division managers of two separate Directorates in Lewis, and other presentations are in the planning stages.

	Recommendations	Status
14.	The WCPI Negotiation/Award Subcommittee work toward developing better guidelines for the extent and content of negotiation memoranda.	Draft guideline in preparation
15.	Assign the Operations Office the task of coordinating the revision of Lewis Management Instruction 5101.3B to increase threshold for legal review to $500,000, clarify the role and purpose of legal review, exclude the exercise of hard options from legal review, and require all comments resulting from legal review to be written on form NASA-C-94.	Action pending
16.	The Policy and Procedures Board prepare and distribute a Division-wide memo stating that response/resolution of legal comments, documented in the contract file, is normally sufficient and solicitations estimated to exceed $100,000 will be reviewed (by legal office) on a selective basis.	Action pending
17.	The Operations Office obtain legal review and concurrence for the "cookbook," revisions thereto, and other new standardized documents deemed appropriate, before Division issuance/distribution. Once approved by legal office, send a sufficient number of copies to the Office of Chief Counsel management, and request that they be distributed to reviewers with a statement that the articles/provisions have been approved for legal sufficiency.	Under review by legal office
18.	Eliminate Small Business Office review of the award file and revise the review and approval matrix accordingly.	Completed 12/85
19.	The Operations Office, with concurrence of the Policy and Procedures Board, revise the review and approval matrix (for solicitations, prenegotiation positions, and awards) to clarify the order of review routing.	Completed 10/28/85
20.	Contracting Officer warrant authority delegation (excluding purchasing agents), be extended as follows:	Completed 12/85, except GS-9 (no action taken)
	GS-9 — Actions as large as $50K, letters, and documents that are currently issued under the Contract Specialist's signature	
	GS-11 — Actions as large as $100K, letters, and documents that are currently issued under the Contract Specialist's signature	
	GS-12 — Actions as large as $500K, letters, and documents that are currently issued under the Contract Specialist's signature	
	GS-12 & above — In addition to the above: incremental funding actions and property actions (such as transfer or disposal) in any dollar amount	
21.	Direct the Division Training Officer to review and possibly revise the current practice of providing training in the negotiation process to provide the basic negotiation course earlier, and consider the feasibility of offering training in advanced negotiation techniques and tactics for experienced Contract Specialists.	Completed 12/85

Appendix B - Roster of Key Personnel

Pilot Manager: Bradley J. Baker

Steering Committee:
Joseph A. Saggio, Chief, Procurement Division
Bradley J. Baker
James E. Bolander
Gerard A. Boulanger
Dianna H. Corso
Ronald E. Everett
Robert L. Firestone
Marc Hudson
Paul A. Karla
Anthony Long
June L. Mischnick
Leonard W. Schopen
Jack P. Shinn
Harlan M. Simon
Paivi H. Tripp

Task Force:
Bradley J. Baker, Chairman
Thomas P. Burke
Raymond J. Galgas
Donald F. Hoffman
Jane M. Reutter
Gloria J. Richards
Paivi H. Tripp

NASA Goddard Space Flight Center, Financial Management Division*

Overview

To better serve the needs of its customers, the Financial Management Division (FMD) participated in the White Collar Productivity Improvement (WCPI) project. The Accounting Branch and the FMD Systems Office were selected as the targets of the project because, together, they met the criteria for a pilot project and they were about to undergo change, partially due to changes in the automated data processing (ADP) function. A project structure was established whereby a steering committee oversaw the activities of three independent task teams which researched more productive methods and workflow to achieve organizational goals and objectives.

Nine major recommendations were developed which represented 36 specific proposals by the three task teams - recommendations which impact organizational structure, individual development plans, and office workflow. Besides the potential improvement from the recommendations, more intangible benefits such as greater employee involvement, knowledge of others' jobs, and a more positive outlook toward the organization's future have been observed.

Introduction

The Goddard Space Flight Center FMD directs the development and operation of a complex group of accounting systems as well as other functional organizations (figure 9) to facilitate timely and proper control and expenditure of funds and to assure allocation of costs to appropriate missions and functions. The pilot group included the Accounting Branch and the Systems Office.

Of the more than 80 personnel in the FMD, more than 50 are assigned to the Accounting Branch, which is responsible for the management and accomplishment of day-to-day operation of accounting functions as well as the direction of long-term systems development. The majority of accounting personnel are clerical employees involved in processing contractual records, examining and preparing bills for payment by the Treasury Department, and payroll functions. A subset of the accounting personnel are degreed professionals who manage the various functions and, within the General Ledger Section, analyze and allocate costs and prepare operational reports on funds control, costs, and volume of business.

To support the accounting functions, the FMD Systems Office provides ADP systems development, including coordination of programming and mainframe computer support from a non-FMD organization, the Computer Services Branch. The Systems Office includes five professional employees.

Within these two FMD organizations, the Accounting Branch and the Systems Office, the necessity for changes, especially those caused by the nature of changes in the processing and management of information, was recognized. In addition, at the time of the pilot scouting mission, several Accounting Branch personnel were about to retire (taking with them many years of experience) and, in varying degrees, there was apprehension about the use of modern ADP technology, including desktop computers. It was clear to many, especially the Division Chief, that the next generation of equipment, systems, and personnel must be more attuned to current technology and the changing environment.

Thus, the stage was set for the introduction of the WCPI approach to evaluate and improve the efficiency and effectiveness of the accounting systems-related functions and organizational structure through the generation of proposals for productivity improvement. The organizational expectation was that employee involvement should improve the attitudes of many employees and allay the fear of change, thus increasing the overall productivity of the Division.

Approximately one-third of the FMD employees were assigned to the four elements directly supporting the WCPI effort:

*By Richard F. Baker, Chief, Financial Analysis and Internal Review Branch.

Organizational Structure for WCPI Project

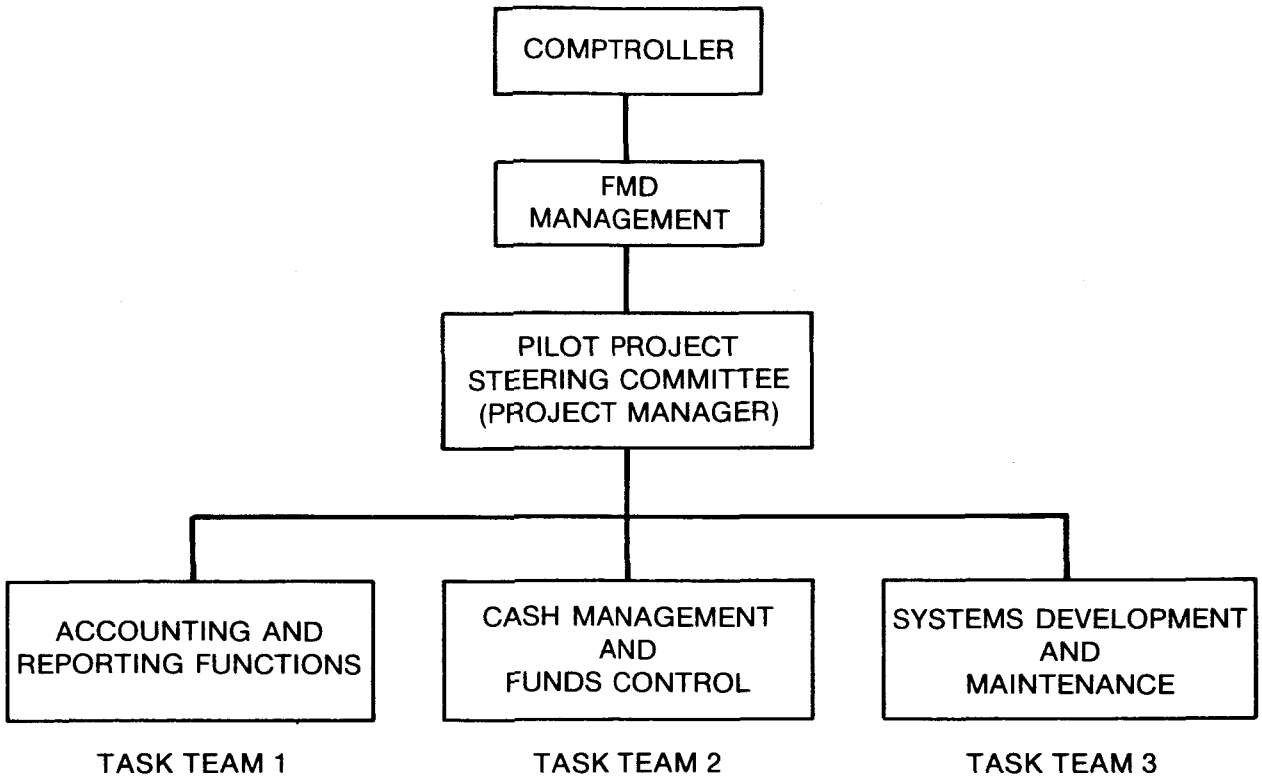

Figure 10

learning experience and an important first step in FMD's goal of system redesign. Services, objectives, and measures identified are shown in figure 13. The various phases of the methodology are discussed hereafter as they relate to each task team.

Task Team 1

Task Team 1, composed of professionals and nonprofessionals from five sections, had little difficulty in performing the scouting mission, diagnosing the problems, and establishing objectives. The problems addressed by Task Team 1 were clear cut, and there was general agreement as to what should be done to overcome the problems. However, Task Team 1 encountered some difficulties in the measurement phase. This was not totally unexpected because for white collar activities, quantitative measurement is often very difficult, if not impossible, to define. Task Team 1 spent a great deal of time attempting to overcome this roadblock. Moreover, the steering committee and team leader could not provide definitive measurements for all the objectives presented. As a result, only timeliness measures have been defined to date. This problem was believed to be a function of developing white collar productivity measurements in general and did not reflect on the abilities of the team members.

The difficulty in defining measurements had some effect on the recommendations for system redesign. However, as team members interacted during the process and started getting feedback from other task teams, the steering committee, and FMD management, a plan for system redesign began to emerge. Teamwork was a particularly important result of the WCPI process. Team members used the team approach to overcome many of the roadblocks and were greatly encouraged by the

The WCPI Process as Implemented

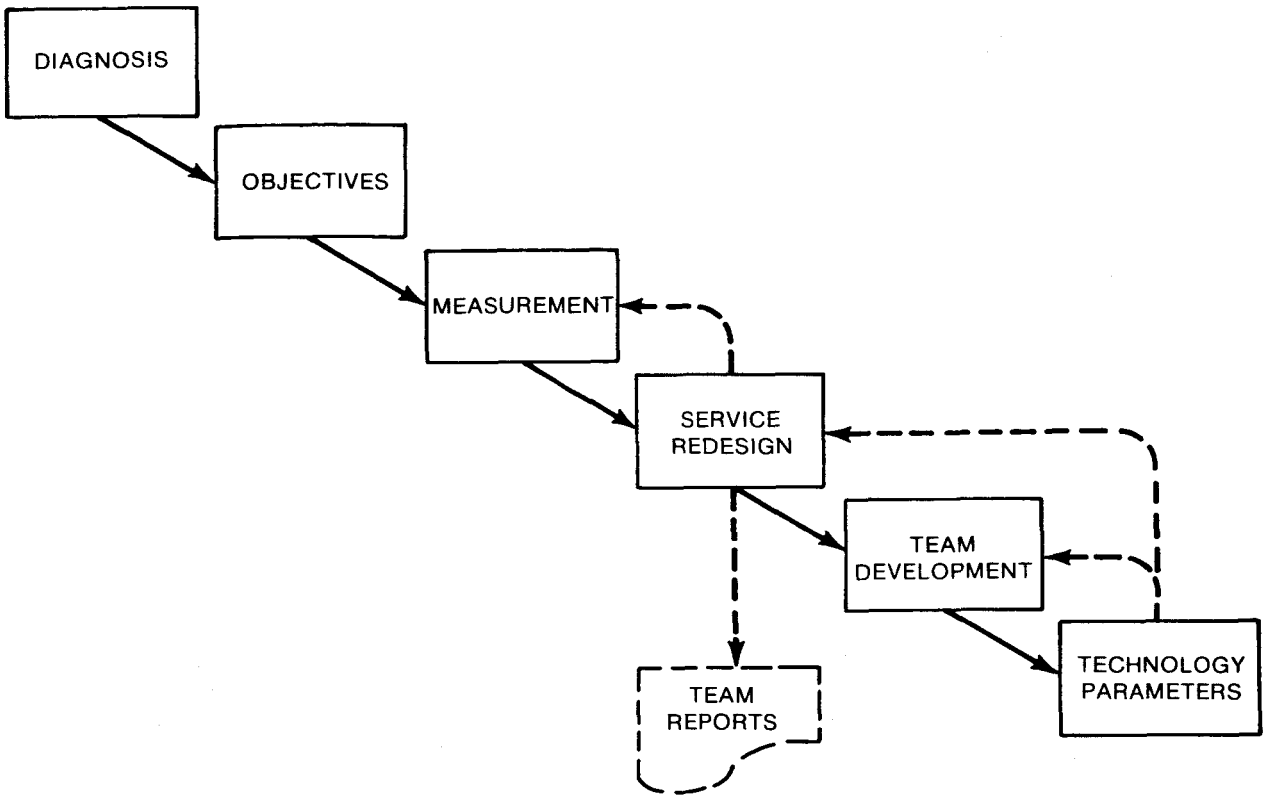

Figure 12

Team 2 was especially successful in that it developed the following detailed proposal for a major redesign of the operation -- a "team concept," which will affect virtually all employees of the Accounting Branch:

Accounting Branch Team Concept

The proposal is that the personnel performing the following activities (commitments, obligations, disbursements, and liquidation) be realigned to form teams. These teams will adopt a modified "cradle-to-grave" concept.

It is proposed that the Accounting Operations Section and the Voucher Examination Section be combined into one section which would consist of four teams, each team having a team leader. The section would have a supervisor, a senior accounting technician, and one clerical employee assigned to the supervisor.

Team 1: 5 accounting technicians for even-numbered purchase orders (to include 1 team leader); 1 accounting technician for commitments

Team 2: 5 accounting technicians for odd-numbered purchase orders (to include 1 team leader); 1 accounting technician for Government Bills of Lading and batch breakdown

Team 3: 6 accounting technicians for contracts (to include 1 team leader)

Team 4: 3 Clerk Typists for scheduling purchase order and contract payments (to include 1 team leader)

Service: Maintain systems which are responsive to the needs of the user community and meet the intent of regulatory and internal control requirements.	
Objectives	**Measures**
Maintain existing systems and develop appropriate documentation to satisfy user needs.	Averaged lapsed time from receipt of request for service to implementation of change or new requirement
Provide user training.	Number of systems documented per time period (e.g., 6 months)
Move the FMD in a direction of leadership in the area of accounting and financial management automation.	Ratio of time spent maintaining existing systems vs time spent on new system development
Comply with the intent of all applicable standards.	

Figure 13.- Concluded

2. Training in the WCPI process is important to utilize resources most effectively.

3. An ongoing productivity group is needed to:

   a. Foster approved change proposals

   b. Facilitate new productivity initiatives

4. Effective team organization was an important factor in the group's success in developing objectives, measures, and the "team concept" redesign proposal.

Pilot Methodology - Task Team 3

Task Team 3 had perhaps the most diverse perspective of any task team with members ranging from branch heads to operating accountants. The supervisors tended to have a different viewpoint on methodologies than did the operating personnel. As a result, the task team had difficulty in attaining a well focused perspective on the methodology for the process, and much time was spent in discussing positions, attempting to resolve differences, and seeking consensus.

One very positive outcome of these discussions was that all members of the task team achieved a far greater understanding of the part individuals played in the organization. The role of each member was defined, especially in the area of system development, and the way in which work was accomplished and could be improved became clearer. Service redesign, team development, and technology parameters evolved through this process. At times, the process was very long, but specific recommendations did emerge from the open and frank exchange of ideas, comments, and concerns.

Team 3 made the following service redesign recommendations:

1. Reorganization of responsibility for project management of systems development and maintenance from a central systems office to branch offices responsible for operations output.

2. Establishment of a central technical support office for oversight of system change requirements, clerical and word processing support, troubleshooting of short-term systems problems, and Division-wide resources management support.

3. Establishment of a Division approval process and monitoring system for systems development.

4. Establishment of a new position: Division systems accountant.

The task team felt that the WCPI process had provided a good forum through which all team members could become involved in system redesign. By defining roles in the organization and analyzing the delivery of services, significant redesign had been identified.

As a result of Team 3's experience, the following recommendations are made to streamline the WCPI improvement process:

Table 1

Pilot Project, Accounting Operations and Systems Development

As of: January 10, 1986

Major recommendations	Not started	In process	Implemented
Initiate use of team concept		X	
Establish technical support organization		X	
Redefine role of Systems Office			X
Integrate responsibility for systems development into line organization			X
Minimize working supervisors	X		
Improve customer relations		X	
Improve career opportunities for technicians	X		
Explore use of support contractors	X		
Automate numerous manual functions		X	

There is some concern that FMD, as an organization, might overemphasize productivity participation to the point that day-to-day services suffer. Therefore, one of the tasks of the PAC will be to balance productivity improvement efforts with the need to maintain ongoing, required services to "customers."

Conclusions

1. The pilot study in WCPI was well worth the manpower investment because of the following improvements.

   a. Increased employee awareness of productivity emphasis and methods

   b. Increased employee effectiveness because of knowledge of others' needs, both those within FMD and its "customers"

2. Change is critical to the improvement of productivity, but change must be managed. Change should not be an end in itself - it must be purposeful, controlled, and understood by those affected by it.

3. Employee participation is essential to effectively change the workplace. However, employee participation does not require that decision making be delegated to a group - the important aspect is that employees have the opportunity for input into the decision-making process whenever possible.

4. Increased levels of risk taking may be necessary to increase productivity, but properly structured and operating internal controls may effectively reduce risks to an acceptable level.

NASA Marshall Space Flight Center, Science and Engineering Directorate, Office of the Associate Director for Management*

Overview

The Marshall Space Flight Center (MSFC) selected the office of the Associate Director for Management, Science and Engineering (S&E) Directorate, as the site for a White Collar Productivity Improvement (WCPI) pilot project, and the pilot project manager was introduced to the methodology at a WCPI project conference held in January 1984. The pilot project was initiated by the pilot manager with briefings to MSFC officials and pilot staff on the methodology to be employed and the expected results.

The WCPI consultant quickly proceeded with the diagnosis phase which resulted in a very frank and open discussion of pilot group conditions, problems, complaints, and expectations. A pilot group steering committee was formed and chaired by the pilot manager to put the methodology into effect, and task teams were activated to support the steering committee as required to work on action items. As the project proceeded through the objectives, measurement, and service redesign phases, the pilot group employees were very supportive of the process as they participated in action item work.

Pilot management also was committed to the improvement effort throughout the project and took quick action to provide management input to and approval for the various process phases. Although the Associate Director for Management was promoted to a new position and was replaced by one of the pilot group key managers during the project, this move had no adverse impact on the conduct of the project.

The project has been successful to date, and plans have been made to continue the effort on an indefinite basis. Time will be required to fully evaluate the success or failure of the activity since it takes time to institute and evaluate change. Those who have worked closely with the project are highly aware of the potential improvement that can be realized as long as management recognizes and desires participative support.

*By Lawrence J. Smith, Chief, Laboratory Support Branch.

Introduction

The MSFC initiated the WCPI project to improve the effectiveness of two organizational elements within the office of the Associate Director for Management in the S&E Directorate: the Resources Requirements Office and the Planning and Control Office. These two offices, hereafter referred to as the pilot group, consist of 76 personnel, of which 9 are engineers, 10 are clerks, and 57 are business professionals. Organizational structure is shown in figure 14.

The Resources Requirements Office provides resources management support to the S&E Directorate laboratories for the development of requirements and execution of assigned missions and objectives, acts as interface between the laboratories and MSFC support operations, serves as focal point for the management overview of all S&E Directorate computer resources, and maintains the Management Information System for the management overview and control of S&E Directorate resources and procurement activities. The Planning and Control Office directs development and management of an integrated S&E Directorate-wide program control, resources, and manpower management program. This includes the development of resource guidelines and requirements, provision of S&E Directorate consolidated inputs to MSFC management, and the distribution of resources consistent with established plans and objectives.

The pilot project was staffed with a pilot coordinator, a pilot project manager, and an eight-member steering committee. The pilot coordinator, who is the Director of the Office of Associate Director for Management in the S&E Directorate, acted as the focal point with the Center Productivity Council, other NASA centers, Headquarters, and the NASA liaison for the WCPI process. The pilot manager, who is the Chief of the Laboratory Support Branch, directed all project activities including implementing the methodology, developing

Key WCPI Project Activities
CY 1985

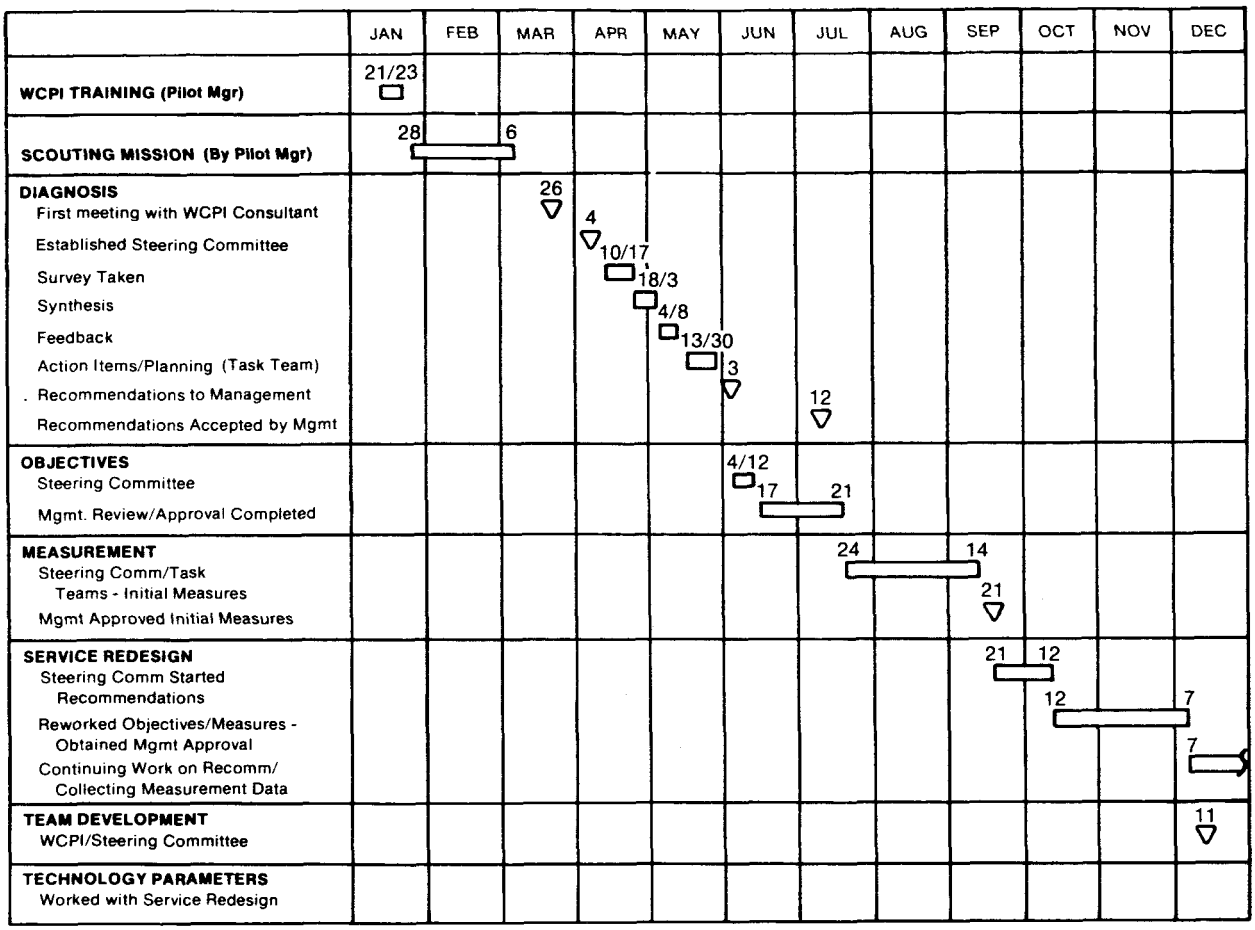

Figure 15

made to brief the pilot group members. The project was pursued in accordance with the WCPI methodology as implemented by the WCPI consultant assigned to the project.

Scouting Mission

The pilot manager presented the pilot group at large with an overview of the entire project, including the six-phase methodology and expected results. Because of the size of the pilot group, three briefings were necessary to complete this task.

Lessons learned during the scouting activity include:

1. The scouting mission is very important because it is the first exposure of the project to the pilot group. Therefore, it is important that a positive, comprehensive picture be presented to the group concerning project content and the expectations of success.

2. It is equally important that the right organizational area be chosen for a first pilot project -- an area that can be expected to yield identifiable and lasting results. Emphasis should be placed on selection of an appropriate pilot site.

3. In future pilot projects, this phase would be a good time to develop the proposed pilot

WCPI consultant, the list was finalized and submitted to pilot group management for approval. All of the statements were aimed at improving the effective delivery of services to customers and promoting improvement in quantity of worklife issues.

It was not until the project progressed to the measurement phase that concern developed about the great amount of detail involved in this approach to the methodology.

In addition to steering committee activity to develop the objectives, the task teams completed their "quick-fix" recommendations and management acceptance was confirmed to the pilot group by letter.

Measurement Phase

The pilot group management accepted the key result areas, key objectives, and specific objectives as reasonable and directed the steering committee to proceed to develop measures for these objectives. The WCPI consultant and NASA liaison representative conducted a 2-day session to train the steering committee in WCPI measurement philosophy, and measures were developed for 37 of the 50 specific objectives; the remaining 13 were felt to be too subjective to quantify. The measures developed were quantitative and timeliness measures; however, the steering committee had a difficult time developing any kind of meaningful quality, effectiveness, or resource utilization type measures because the specific objectives were statements of accomplishment which lent themselves primarily to time/quantity type measures.

Pilot group management reviewed the attempt at measurement and agreed it was a good initial effort. Because of the need to move on to the next phase of the project, the steering committee and the WCPI consultant decided to proceed to service redesign, hoping that some new ideas concerning measurement might surface because of this effort.

Based on the pilot group's experience with developing measures after identifying key and specific objectives, it is felt that it might have been more useful to have used the specific objectives as measures rather than identifying other indicators of progress.

Service Redesign and Technology Parameters

Since the MSFC was in the process of automating business operations, it was decided that little effort was required in the technology parameters arena. As automation progresses, the steering committee will stay abreast of developments and make recommendations/input as appropriate to provide the most effective tools to improve operations. However, a review of office design did lead to a recommendation to refurbish existing office furniture.

Service redesign provided an indepth review of the pilot group's services and how they were presently being provided. As a result, 15 recommendations were developed to enhance the effective delivery of those services that included a variety of improved processes and procedures as well as several quality of worklife enhancements (see appendix B).

At this point, the pilot manager and the steering committee also decided to review the objectives and measures to attempt to reduce the number to a more workable configuration. The original eight services were synthesized into two more general statements. The key result areas, key objectives, and specific objectives were reconfigured into four broad objectives for each of the two services, with two of the objectives common to both services. Measures developed for these objectives provided a better balance between efficiency and effectiveness indicators as follows:

Quantitative	11
Qualitative	7
Timeliness	10
Resource utilization	4
Effectiveness	8

Pilot management fully endorsed the new objective/measurement plans (figures 16 and 17).

During the service redesign phase, the steering committee also interviewed two key interface organizations and received an excellent overview of their operations and many helpful suggestions for enhancing operations to reduce time and improve quality. This phase seems to have been the most worthwhile phase for the pilot group, because it marked the first time the

Objectives/Measures Common to Both Services

Objectives	Measures
Provide and maintain an adequate, balanced, and trained workforce with appropriate recognition and rewards for quality performance and productiveness.	Training hours taken on recommended courses / Training hours needed for recommended courses - Vacancies in workforce / Assigned pilot group staffing levels - Retirement eligibles / Workforce - Professional interns retained / Total professional interns - Co-op's retained / Total co-op's - Awards prior FY (including group awards) / Number awards current FY - $ available prior yr / $ available current yr - Professional minority personnel in pilot group / Total professional pilot group - Nonprofessional minority personnel in pilot group / Total nonprofessional personnel in pilot group - Minority supervisors / Total supervisors
Provision of proper office and communication equipment, facilities, efficient work methods, and open communications to sustain and/or improve workforce productiveness.	Provision of highly trained person(s) as contact point for helping personnel troubleshoot problems in Management Information System (MIS) MIS equipment in pilot group / Pilot group personnel trained in use of MIS equipment Square foot per person by organization/location / Square foot per person standard Survey pilot group periodically to determine progress in this objective

Figure 17

in the project was primarily the result of steering committee and task team activity. In addition, pilot group management agreed that an ongoing effort was required by the steering committee to continue this project and a special team building effort centered around the development of a charter for the steering committee and formulating plans for continuing the productivity improvement effort in the future.

Benefits, Continuing Efforts, and Conclusions

The biggest benefit perceived on this project to date is that the staff has been given an opportunity to express their concerns about the organization and participate in the correction and/or improvement of the pilot group operations, workplace, and environment. The pilot project has not progressed far enough to cite any lasting impacts; however, an ongoing effort is anticipated that will help problem areas surface and provide more permanent solutions.

Appendix A - "Quick Fix" Issues and Recommendations Resulting from Diagnosis Phase

Issue	Recommendations	Action
Work-in-progress meetings are a waste of time.	Provide status of items more than 3 weeks old at bi-weekly WIP meetings with group chiefs responsible for identifying items for discussion. Attendance to include the Associate Director for Management(EM), office and branch chiefs, analysts selected by the group chiefs, and other interested persons. Analysts to provide group chiefs status of WIP more than 3 weeks old on a weekly basis for review/discussion.	Implemented
Signature requirements in Science and Engineering Directorate need to be improved.	Lower signature authority on selected procurement documents, permit telephone fund approval in certain cases, eliminate unncessary signatures, and initiate review of MSFC and Directorate regulations to identify additional potential for streamlining signature requirements.	Recommendations within control of pilot organization were implemented. Those requiring a change in MSFC or Directorate policy referred to a task team to develop formal recommendations to be forwarded to appropriate management.
Training does not appear to exist in any formal program.	Develop a manual for employees to include organizational and functional responsibilities and selected topics related to Directorate and Center policy; develop detailed operating procedures for various functions and responsibilities.	Committee to develop a manual and procedures.
	Stress the importance of first/second line supervisors spending more time orienting new employees.	Supervisors so instructed by memorandum.
	Authorize the task team to develop a recommendation for specific training needs of EM employee.	Task team developing training proposals.
Managers and supervisors provide mostly an administrative function.	First and second line supervisors meet periodically to discuss supervisory roles. Second line supervisors emphasize what they expect from the first line supervisors, ensure that they understand their admininstrative role, are aware of the first line supervisors "management style," and assure themselves that work is being accomplished in the most effective and productive manner.	First and second line supervisors directed to implement recommendations through the performance appraisal process, as well as through daily working relationships.

Appendix B - Service Redesign Recommendations

The following is a listing of all recommendations sent to pilot management and current status.

	Recommendations	Status
1.	Chief engineers/program offices provide an approved budget plan at the beginning of the FY.	Action underway by management
2.	Program analysts be colocated in program offices not providing approved budget plans.	Not accepted
3.	An accomodation be worked out with Computer Services Lab on processing ADP supplies/materials.	New procedure being developed
4.	Associate Director for Management no longer review senstive/nice-to-have lab requirements.	Letter implementing change to be drafted
5.	Standard feedback to be provided on status of FedStrip/MIL Strip procurements.	Action assigned to management
6.	Standard processing time be negotiated with Property Management Division.	Action assigned to management
7.	Modify work-in progress report to retain action items until contract/purchase order has been awarded.	To be implemented with new automated system
8.	Delegate signature authority to colocated senior analyst for procurement data forms 404 and 55.	Action assigned to management
9.	Give lab directors specific travel budgets and signature authority for travel requirements.	Budgets implemented; signature authority under management review
10.	Refinish and reupholster pilot group gray furniture.	Action underway by management
11.	Pilot group first line supervisors select personnel for awards, and awards be presented formally.	Associate Director for Management to discuss policy with supervisors
12.	Establish a Center policy requiring program/ project offices to establish an annual budget for S&E labs.	Current Center policy to be reviewed by steering committee
13.	Provide all pilot group locations with updated copies of regulations/policies/procedures.	Steering committee to develop proposed list of regulations, etc.
14.	Financial Management Office distribute manpower usage reports to colocated offices.	Action assigned to management
15.	Center mail personnel deliver mail for colocated personnel to colocated sites.	Action pending

Increase Awareness of Pilot Area Roles/Responsibilities Within Pilot Area - (Including Orientation - Center Activities)

Task Team Leader: Roger Nicholson, EM12B

Team Members:
Marie Wells, EM13
Dave Arnold, Institutional Support Branch (EM25)
Rita Eldridge, EM13A
Regina Pettus, EM12B

Increase Management Exposure/Involvement with Staff (Improve Formal Communication with Staff)

Task Team Leader: Cullan Bowling, Supervisor, EM13A

Team Members:
Carolyn Spray, EM13B
Ed Ogozalek, EM25
Mack Thompson, EM12A
Clarence Gearhart, EM25

Measurement Task Teams

Key Result Area - Support to Labs

Team Leader: Cullan Bowling, Supervisor, EM13A

Team Members:
Herman Schrimsher, EM12A
Dick Cizek, EM12A
Hugh Mercer, EM24
Clarence Gearhart, EM25
Sam Jordan, EM13B

Key Result Area - Administrative Policy Compliance/Management

Team Leader: Dave Arnold, EM25

Team Members:
Don Laurine, Supervisor, EM24
Mack Thompson, EM12A
Jeanne Smith, EM13B
Jim Venus, EM13B
Sam Davis, Administrative Office, Office of Associate Director for Management (EM34)

Key Result Area - Employer/Employee Relations

Team Leader: Roger Nicholson, Data Management Requirements Branch (EM12B)

Team Members:
Judy Carr, Administrative Office, Office of Associate Director for Management (EM35)
Rita Eldridge, Laboratory Support Branch (EM13A)
Ramon Scott, EM12A
Marie Wells, EM13
Jim Strong, Supervisor, EM13B

NASA Ames Research Center, Technical Information Division*

Overview

The Technical Information Division began its participation in the White Collar Productivity Improvement (WCPI) project on February 7, 1985, with the first visit of the WCPI consultant to Ames Research Center. Because of the need to complete the six phases of the methodology by August 1985, the decision was made for the consultant to lead the Technical Information Division through the methodology at a brisk pace. To help meet the August deadline, planning was begun early in the process to provide the necessary support from management, to introduce the methodology to the staff, to involve clients, where appropriate, and to secure the necessary facilities and resources. Starting in March 1985, each of the six phases was dealt with for approximately 1 month. The last two phases, team development and technology parameters, were combined into one session.

The success of the accelerated approach is felt to have been the result of the concentration of effort and interest on the part of the staff. The shorter timeframe complemented the rigor of the methodology by causing the steering committee and staff to focus on only those issues that were perceived as having the greatest potential for productivity improvement. Although a great many action items were identified, only those with the highest priority have been addressed.

Following the August deadline, the steering committee has continued to function and take an active part in the integration of the Technical Information Division's products and services into the Ames Research Center's research and development activities.

*By J. Paul Bennett, Chief, Technical Information Division.

Introduction

The Technical Information Division (figure 18) provides scientific and technical information services to the Ames Research Center's scientists, engineers, and administrators located at both the Ames-Moffett and Ames-Dryden sites. These elements provide technical graphics services, undertake design, coordination, and display of scientific exhibits; edit and prepare for publication the manuscripts of various reports, articles, and papers; and print, duplicate, and reproduce a variety of illustrations and publications. The Division's Library Branch also operates a research library at each installation.

The pilot group consisted of Division personnel located at Ames-Moffett, excluding the library staff (however, the Library Branch was represented on the steering committee). This group included 20 administrative personnel, 3 technicians, and 4 clerical employees. Contractor staff supporting the Division participated in the Division training seminars but were not represented on the steering committee. No unique external circumstances or reorganization impacted the pilot effort.

The Division Chief served as project coordinator. A visual information specialist in the Graphics and Exhibits Branch was pilot manager and chaired the seven-member steering committee, which included representatives of the Technical Information Division branches and the Division office.

Pilot Project Implementation

The pilot manager and pilot coordinator attended the WCPI training session in Houston, Texas, in January. The scouting mission was conducted by the WCPI consultant and the NASA liaison's representative in early February. They returned later that month to hold interviews with and administer survey questionnaires to all pilot group members and representatives of the user community. Feedback of results from the interviews and the surveys was presented in March. Beginning in April and ending in August, the WCPI consultant introduced the subsequent phases of the methodology (figure 19). The Division obtained the services of an independent consultant for a consensus-building activity for the entire Division in April;

he returned in July to conduct a Division seminar on developing communication skills.

The WCPI methodology was carried out without significant changes. In fact, with the exception of the accelerated pace, the WCPI methodology was followed as prescribed in the training guides. Because there was no previous experience in the Division with productivity improvement programs, it was felt that an attempt to redesign or expand the methodology would be inappropriate.

Rather, the pilot group chose to take a textbook approach and to follow the lead of the WCPI consultant.

Each of the six phases was introduced and worked through in turn. The steering committee was given and accepted the responsibility for making the necessary arrangements, plans, and recommendations for implementation. Because of the combined representation of management and staff on the steering committee, implementation of action items without further deliberation within the branches or Division was frequently possible.

Another facilitating feature of the steering committee was size. The seven-member committee was composed of approximately one-quarter of the pilot group. This meant that committee activities were quickly made known to the rest of the pilot group, rapid feedback was provided, and the need for prolonged consensus-building activities was reduced.

The size of the steering group also reduced the need for additional task forces for two reasons. First, a significant and representative number of employees were already involved on the steering committee. Second, due to the small size of the pilot group, it was difficult to commit additional employees to the effort on a continuing basis. In lieu of establishing task teams, additional participation was achieved by asking one or two employees to undertake special assignments to support the steering committee's efforts.

The methodology was used as an approach to dealing with a number of issues that regularly confronted the Division. A structure was provided with which to organize and prioritize concerns, problems, resolutions, and commitments. The pilot group found a great deal of "common sense" inherent in the methodology which, when applied to an organization frequently caught up in a "fire fighting" mode of operation, helped demonstrate alternative approaches to providing services and dealing with clients. The pilot group concluded that the methodology was a tool that, if effectively used, could lead to significant improvements in an organization's productivity.

The identified Division services, objectives, and measures are shown in figure 20. Measurements for the first two objectives have been incorporated into a User Survey Questionnaire (appendix A). This survey has been conducted once. The same survey instrument will be used in the future and the results compared. The results of the first issuance of the survey which establishes the baseline are shown in figure 21. Measurements for the remaining objectives will be implemented in the future.

To date, the Division has experienced no major redesign. The emphasis has been on streamlining and refining the interfaces between the branches. These are important because expediting projects through the Division requires close coordination and cooperation between branches. Efforts in this area are beginning to show positive results throughout the Division; problem solving is taking place at lower levels, and there is evidence of increased collaboration and a reduction of questions of jurisdiction. For example, the sizing of figures for publication has for years been an irritant within the Division; no one branch would accept the responsibility and no standards had been agreed upon. This issue has now been resolved and sizing of figures is no longer an impediment to productivity.

Benefits

An assessment of tangible benefits achieved to date suffers from the short time that has elapsed since the process began. Short-term action items have been realized. Long term, lasting benefits are yet to be demonstrated. As has been pointed out previously, the pilot group moved rather quickly through the methodology. While this kept everyone's adrenalin flowing and interest keen, it also left the pilot groups with a list of action items that

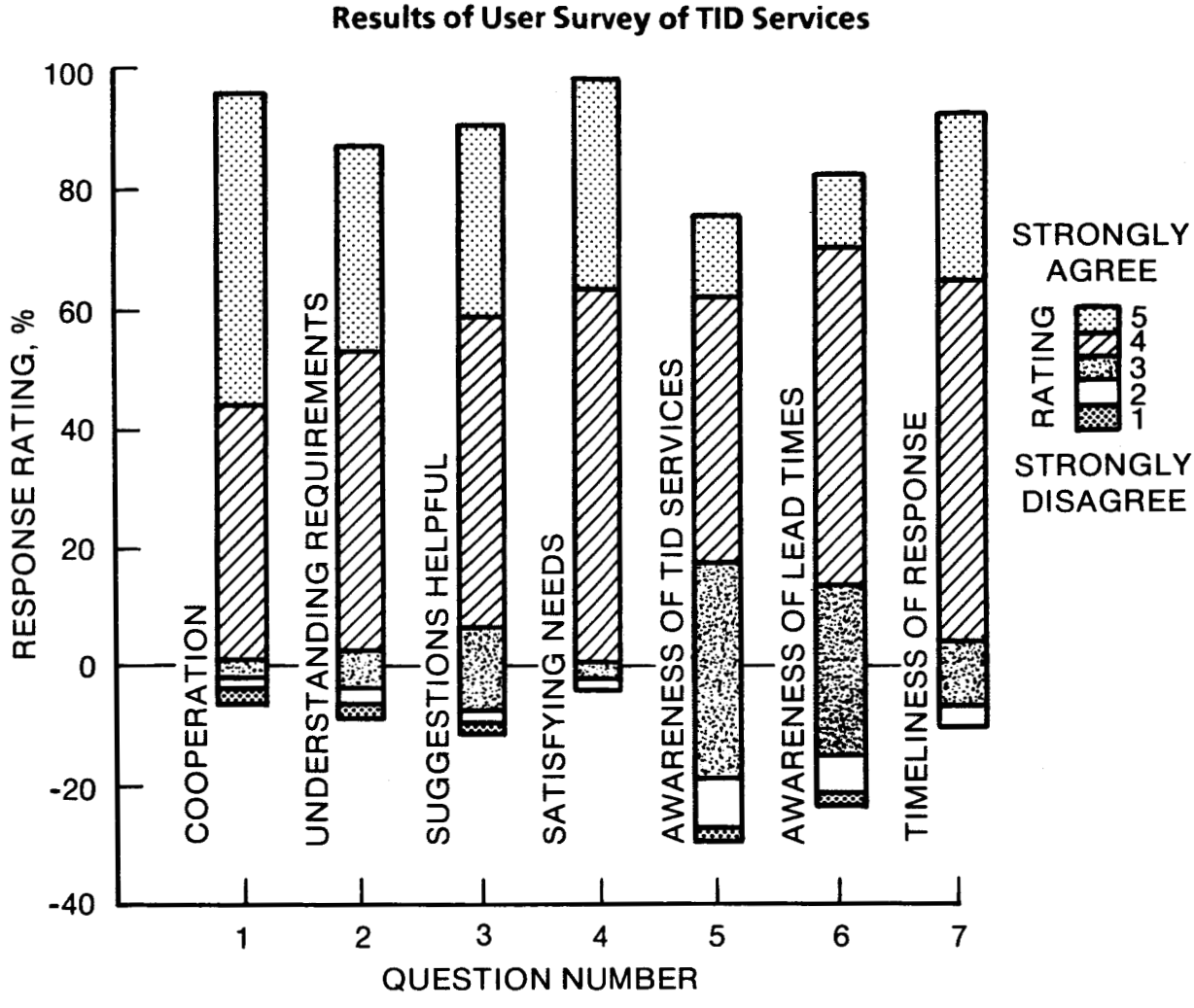

Figure 21

jurisdiction and improve interbranch and intrabranch communications.

As a joint effort, three branches of the Technical Information Division issued a letter to each author of a paper to be presented at a large recurring meeting (appendix B). To test the effectiveness of the letters, a survey (appendix C) was sent to each author. Their positive reactions prompted the reissuing of the letters for a subsequent meeting. In addition, letters were sent to supervisors to request their assistance in expediting the review process. These efforts will help resolve the last-minute meeting paper rush throughout the Division, and the authors will receive more timely, higher quality products.

Acquisition of additional automated equipment, as well as other appropriate technology, is still being planned. After this is installed and up to speed, a common tracking system will be developed for jobs within the Division.

The steering committee now meets twice monthly and is actively implementing other action items and recommendations.

Appendix B - Technical Information Division Letter to Authors

November 18, 1985

To: Distribution (AIAA Meeting Authors)

From: Chief, Technical Information Division

Subject: Papers and Visuals for Upcoming AIAA Meeting

A stressless holiday can be yours (and ours), and you can still attend the January meeting in Reno with your paper in hand. In the spirit of the season, TID would like to share some reminders with you.

Publications Branch

- If you have not yet submitted your paper and you plan for us to process it, please call us at extension 5576. Together, we can discuss a schedule that will bring all the parts together in the fastest and best way possible.
- When you bring your paper to Publications, remember to include all forms and materials necessary to produce the paper:
  - A copy of the approved authorizations for distribution (Forms ARC 414 and FF 427), approved Service Request and ARC Form 310, AIAA cover and paper number, AIAA mats, and instructions.

Graphics and Exhibits Branch

- Because computer graphics are being used more in papers, we suggest that the graphics have a heavier line weight, if possible, and be printed with a laser printer. In that way, they will still be readable after the final reduction in size. It would be to your advantage to call Graphics, extension 5660, about the size of the printed computer image.
- Remember to allow time to get other figures drawn, PMT copies made, and slides made after the paper is completed.
- Any photographs should be furnished or ordered in the proper size in advance by the requestor or by this Branch.

Reproduction Services Branch

- Because we will print your paper here, the unusually large number of papers and copies required will take an average of 2-3 weeks to print.

If we all work together on this occasion, we can all have happy holidays.

Paul Bennett

Appendix D - Technical Information Division Key Pilot Project Personnel

Project Coordinator: Paul Bennett
Chief, Technical Information Division

Pilot Manager: Roger Ashbaugh
Visual Information Specialist, Graphics and Exhibits Branch

Steering Committee

Original Members:

Roger Ashbaugh
Chairman

Darryll Stroud
Chief, Graphics and Exhibits Branch

Alberta Cox — Ex officio
Chief, Publications Branch

Lorraine Tanner — Ex officio
Editor, Publications Branch

George Roncaglia
Librarian, Library Branch

Richard Anderson — Ex officio
Printing Specialist, Reproduction Services Branch

Joyce Courtney — Ex officio
Secretary, Technical Information Division Office

New Members:

Sarah Law
Editor, Publications Branch

Denise Brown
Editor, Publications Branch

Eugene Pineda
Printing Specialist, Reproduction Services Branch

Etta Rosamond
Staff Assistant, Division Office

NASA Johnson Space Center, Life Sciences Project Division*

Overview

A White Collar Productivity Improvement (WCPI) pilot project was initiated by the NASA Johnson Space Center, Life Sciences Project Division (LSPD), in January 1985. A summary/overview of this pilot project is presented, with more specific results noted in subsequent paragraphs and in the appendixes.

The Life Sciences Project Division's primary function is to support NASA's Life Sciences Flight Experiments Program and, in so doing, to manage and develop experiments and hardware for flight on the Space Shuttle/Spacelab. The pilot project encompassed the entire Division of 44 civil service personnel: 6 management personnel, 5 secretaries, 1 scientist, and 32 technical personnel that were primarily engineers. The Division structure at the initiation of the pilot study (figure 22) included four branches, one missions office, and a Project Scientist staff position.

A briefing by the WCPI consultant was given to all Division personnel to explain the proposed project and to determine the degree of interest. Both management and employee personnel were mildly enthusiastic about participation in the project as described. One of the branch managers was selected as a Division coordinator (pilot manager), and he proceeded with the recommended WCPI training which included several seminars.

The scouting/diagnosis phase including surveys and interviews began in February 1985 and extended through March 1985. During this period, a steering committee chairman was selected and a steering committee formed. However, after a relatively good start for the project, three factors significantly affected its continuation after the diagnosis phase.

First, the preparation for a major Life Sciences space flight was at a peak, with key personnel under a heavy workload. Budgeting the time and resources necessary to keep the pilot process moving was extremely difficult. Additionally, mission schedule constraints placed personnel in an unusually high stress situation.

Second, a major reorganization of the Division created a very unstable environment for a period of several months. The four branches were combined into two, with each branch management position being competed for openly. The reorganization structure is shown in figure 23. During this same period, the trained pilot manager, the steering committee chairman, and one steering committee member accepted the opportunity to work with various aspects of the Center's Space Station effort and transferred out of the Division.

Third, steering committee members and the WCPI consultant did not agree on the process to be followed after diagnosis. As a result, the pilot group chose to pursue an alternate approach supported by an independent consultant. The project continued, though enthusiasm waned.

In spite of these impacts, the pilot project did continue, although at a slower pace. A new pilot manager and steering committee chairman were named, the objectives phase completed, task teams formed, and specific actions implemented which are specified in subsequent sections and the appendixes. The project has been based on action planning to address issues identified by the surveys and interviews with emphasis on needs of the Division rather than on following a specific methodology. Although the pilot group has considered objectives, team development, service redesign, and technology parameters because these were issues identified by the survey and interviews, measurement has not been addressed.

Several observations or recommendations may be made as a result of the Division participation in this project.

1. The survey/questionnaire proved to be a valuable tool to identify problem areas and concerns which should be addressed. These areas and concerns may have a direct link with personnel motivation, ways of "doing business," or planning existing and future activities, all of which affect productivity.

*By Fred R.Spross, Chief, Science Operations Branch.

2. The steering committee/task team approach can be an excellent method of creating participation and giving personnel a mechanism to voice their ideas and thoughts; however, the results from each group are highly dependent upon strong leadership within the group, and the more enthusiastic and positive the leader is, the greater will be the output of the team.

3. Finally, any project of this type should not be initiated unless adequate resources are available and time can be budgeted for the task. Areas for improvement should be carefully selected and prioritized to match existing resources.

Pilot Project Implementation

Diagnosis Phase

The results of the questionnaire and interview surveys were divided into two categories by the steering committee: those which pertained to Division management and should be addressed by a Division management team only and those which should be accepted by the steering committee for subsequent assignment to task teams for further definition and setting objectives.

This approach was accepted and the management team and the steering committee initiated their respective phases.

Objectives Phase

Based upon the survey results, the Division management set four specific goals:

1. Improve management/employee relations

2. Define long-range goals and direction of the Division

3. Improve resource acquisition and control

4. Improve Division communication

From each of these goals, a series of near-term and longer-range objectives was derived and is detailed in figure 24. The status of activities related these goals and objectives is provided in appendix A.

The results accepted by the steering committee were placed in seven discrete categories/objectives and prioritized as follows:

1. Improve planning/resources

2. Streamline responsibilities and authority delegation

3. Evaluate safety, reliability, and quality assurance requirements

4. Investigate office automation/services

5. Improve management/employee relations

6. Streamline experiment and hardware development and test

7. Improve personnel training

Because of the limitation of resources, the steering committee chose the first three objectives to assign to task teams. The fourth was assigned to one individual who was uniquely interested in personal computers. The remaining topics were "put on the shelf" until resources could be made available. A chairman for each team was selected from the steering committee and given guidelines for soliciting voluntary participation for the team, limiting teams to no more than six members, combining employees and management in teams, if appropriate, and soliciting other participation for inputs and recommendations throughout the Division, including support contractors.

Acting under these guidelines, each team developed its own set of goals, objectives, and recommendations, and each team presented its report to a combined management team/steering committee meeting at which their recommendations were jointly reviewed. Most of the recommendations were accepted for implementation or further study (appendix B).

Implementation Phase

An implementation phase was initiated after establishing objectives in lieu of following the WCPI methodology, this being perceived as a more immediate and effective method of satisfying specific needs of the Division. Many of the approved recommendations from each of the task teams from the objective phase have

2. Implementation was based on a real need for Division personnel to resolve specific issues rather than following a set methodology.

3. The survey/interview technique did prove to be a useful tool to identify issues.

4. The task team concept to establish and implement recommendations proved very effective and will probably be continued.

5. Strong leadership is essential and directly affects the output and results of a task team.

6. Teams must be very selective in what they attempt and should prioritize tasks to match available resources.

7. It should be recognized that a process based on employee participation such as this does take a significant amount of time and resources.

8. Even though the WCPI methodology was not followed as structured, the group addressed all the phases except measurement. This resulted from the fact that issues identified during diagnosis were focused on clarifying Division goals and redesigning the organization to be more effective. This nonstructured approach proved to have positive results in this case; however, this may not be true in other groups.

Appendix B - Task Team Recommendations

Objective: Improve planning/resources

Recommendations	Action
Establish Division-level planning, scheduling, and resources management function	Accepted, but resources not available. No action taken.
Establish branch-level planning, scheduling, and resources management function	Accepted but resources not available. No action taken.
Establish Division human and facility resources matrix	Rejected because of confidential nature of personal data proposed.
Initiate LSPD marketing program (brochures, tapes, films, conference papers, and displays, etc.)	Accepted and employee assigned to implement program.

Objective: Streamline responsibility and authority delegation

Recommendations	Action
Change Technical Monitor(TM)/Project Engineer authority to include:	
- Conduct of reviews of hardware	Task Team to revise Standard Operating Procedures (SOP's) to reflect the chairing of hardware reviews by technical monitors.
- Sole signature authority over test preparation sheets (TPS's) required to move flight hardware or perform engineering evaluations or periodic maintenance	Task Team to revise SOP's to delete Quality Engineering signature on TPS's for routine movement of hardware. Was also incorporated in the Quality Assurance Division's plan.
Change branch authority to include:	
- Final disposition of hardware review board impasses	Task Team to revise SOP's to implement chairman of review boards as designated Branch Chief responsibility.
- Signature approval for initial statements of work (SOW's), test plans, etc.	Task Team to revise SOP's to implement highest level of approval for initial SOW's, test plans, etc., to branch level.
- Final disposition of TM impasses with quality over nonsafety related issues	Final disposition of TM impasses with Quality over non-safety related issues at the branch level was agreed to in principle, however, will have to be negotiated with Quality organization.
- A firm budget with reserve authority to manage funds within bounds of branch responsibilities, without Change Control Board (CCB) approval	Recommendations associated with budget authority, responsibilities, planning, and coordination considered "noteworthy" and accepted, but it will take some time to work out details and implement. The Management Team accepted actions associated with these recommendations including review of CCB procedures in this area.
- Participation with Division management in the decision process if budget/project scope changes are necessary	

Objective: Evaluate safety, reliability, and quality assurance requirements

Recommendations	Action
R&QA documents go through appropriate LSPD review cycle and come under LSPD CCB	Comments on Quality Assurance plan submitted to the Quality Assurance Division and negotiation on the changes are underway.
LSPD standard operating procedure (SOP) takes precedence over R&QA document should conflict exist	The Management Team will negotiate recommendations on LSPD review of R&QA documentation, and policy disputes.
Policy disputes between SR&QA/LSPD personnel will be decided by LSPD management	
Revise specific areas of LSPD SOP related to hardware control and authorization of work	The Task Team was assigned the action to review and update SOP's associated with hardware control and work authorizing documents
Representative from R&QA be available to support LSPD personnel during regular working hours	Action already initiated to relocate Quality Engineering and Reliability support personnel to provide better availability to LSPD personnel.
NASA Quality Engineering should develop a plan that assures continuous support and submit to LSPD management	
Establish in-house training program for all affected personnel	Quality Assurance Division agreed to conduct three training sessions for LSPD personnel on QA requirements/documentation. Negotiations with Safety and Reliability by the Management Team will be conducted to set up appropriate training in these areas.